

**UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

**Advanced Processor Technologies LLC,
Plaintiff**

v.

CIVIL ACTION NO. 2:11-cv-19

**Analog Devices, Inc;
Cirrus Logic, Inc.;
Conexant Systems, Inc.;
Digi International, Inc.;
Marvell Semiconductor, Inc.;
Micrel, Inc.;
Mindspeed Technologies, Inc.;
Netronome Systems, Inc.; and
Zoran Corporation,**

Jury Trial Demanded

Defendants.

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Advanced Processor Technologies LLC (“APT”) files this complaint against Defendants Analog Devices, Inc., Cirrus Logic, Inc., Conexant Systems, Inc., Digi International, Inc., Marvell Semiconductor, Inc., Micrel, Inc., Mindspeed Technologies, Inc., Netronome Systems, Inc., and Zoran Corporation (collectively “Defendants”) and alleges as follows:

SUBJECT MATTER JURISDICTION

1. This is an action for patent infringement arising under the Patent Laws of the United States, 35 U.S.C. §§ 101, *et seq.* This Court has subject matter jurisdiction over this patent infringement action under 28 U.S.C. §§ 1331, 1332, and 1338(a).

PARTIES AND PERSONAL JURISDICTION

2. Plaintiff APT is a limited liability company organized and existing under the laws of the State of Texas with a principal place of business at 6136 Frisco Square Blvd., 4th floor, Frisco, Texas 75034.

3. On information and belief, Defendant Analog Devices, Inc. (Analog Devices) is a corporation organized under the laws of Massachusetts and maintains its principal place of business at One Technology Way, Norwood, Massachusetts 02062.

4. On information and belief, Analog Devices is registered to do business in the State of Texas and maintains a Sales Office and Design Center in Texas at 6500 River Place Blvd., Bldg. 2, Suite 100, Austin, Texas 78730 and a sales office at 1300 E. Lookout Drive, Suite 330, Richardson, Texas 75082.

5. On information and belief, Analog Devices has continuously maintained a sales office in Richardson, Texas since at least 1999, and from this office has sold, regularly sells, and offers to sell Analog products (including the products accused of infringement in this case) throughout the United States, the State of Texas, and the Eastern District of Texas.

6. Analog has appeared in at least six patent infringement lawsuits filed in courts located in this judicial district, including Civil Action Numbers 1:2003-cv-131, 1:2004-cv-404, 2:2005-cv-184, 2:2006-cv-192, 2:2007-cv-413, and 2:2010-cv-207.

7. On information and belief, Defendant Cirrus Logic, Inc. (Cirrus Logic) is a corporation organized under the laws of the State of Delaware and maintains its principal place of business at 2901 Via Fortuna, Austin, Texas 78746.

8. On information and belief, Cirrus is registered to do business in the State of Texas and has conducted and continues to conduct business within the State of Texas. Cirrus has availed itself of the laws of Texas at least by maintaining its principal place of business in this state and by

employing Texas residents within Texas. Cirrus directly or through intermediaries (for example, via authorized sales representative TriStar Group, 5220 Spring Valley Road #190, Dallas, Texas 75254), ships, distributes, offers for sale, sells, and advertises its products, including the products accused of infringement in this case, in the United States, the State of Texas, and the Eastern District of Texas.

9. On information and belief, Defendant Conexant Systems, Inc. (Conexant) is a corporation organized under the laws of the State of Delaware and maintains its principal place of business at 4000 MacArthur Blvd, Newport Beach, California 92660.

10. On information and belief, Conexant is registered to do business in the State of Texas and has conducted and continues to conduct business within the State of Texas. Conexant directly or through intermediaries (for example, Nu Horizons Electronics, with at least one office in this judicial district), ships, distributes, offers for sale, sells, and advertises its products, including the products accused of infringement in this case, in the United States, the State of Texas, and the Eastern District of Texas.

11. On information and belief, Digi International, Inc. (Digi International) is a corporation organized and existing under the laws of the State of Delaware with its principal place of business located at 11001 Bren Road East, Minnetonka, Minnesota 55343.

12. On information and belief, Digi International is registered to do business in the State of Texas and has conducted and continues to conduct business within the State of Texas. Digi International directly (for example, through its office at 115 Wild Basin Road South, Suite 210, Austin, Texas 78746) or through intermediaries ships, distributes, offers for sale, sells, and advertises its products, including the products accused of infringement in this case, in the United States, the State of Texas, and the Eastern District of Texas.

13. On information and belief, Defendant Marvell Semiconductor, Inc. (Marvell) is a corporation organized and existing under the laws of the State of California and maintains its principal place of business at 5488 Marvell Lane, Santa Clara, California 95054.

14. On information and belief, Marvell is registered to do business in the State of Texas and maintains at least two Texas offices, including one at 1601 South Mopac Expressway, Suite 400, Austin, Texas 78746 and one at 20333 State Highway 249, Suite 200, Houston, Texas 77070. Marvell has also availed itself of the laws of Texas at least by employing Texas residents within Texas.

15. On information and belief, Marvell is registered to do business in the State of Texas and has conducted and continues to conduct business within the State of Texas. Marvell directly (for example, through its Texas offices) or through intermediaries, ships, distributes, offers for sale, sells, and advertises its products, including the products accused of infringement in this case, in the United States, the State of Texas, and the Eastern District of Texas.

16. Marvell has availed itself of this Court's jurisdiction by filing at least three patent infringement lawsuits *as plaintiff* in the Eastern District of Texas, including Civil Action Numbers 6:2007-cv-204, 2:2009-cv-323, and 2:2009-cv-324.

17. Moreover, Marvell has appeared in at least seven additional patent infringement lawsuits as defendant filed in courts located in this judicial district, including Civil Action Numbers 2:2010-cv-216, 2:2010-cv-124, 2:2010-cv-90, 6:2009-cv-143, 2:2007-cv-515, 2:2007-cv-474, and 2:2007-cv-473.

18. On information and belief, Defendant Micrel, Inc. (Micrel) is a corporation organized and existing under the laws of the State of California with its principal place of business located at 2180 Fortune Drive, San Jose, California 95131.

19. On information and belief, Micrel is registered to do business in the State of Texas and has conducted and continues to conduct business within the State of Texas. Micrel directly (for example, in this judicial district through its Central Area Sales Office at 2425 N. Central Expressway, Suite 351, Richardson, Texas 75080) or through intermediaries ships, distributes, offers for sale, sells, and advertises its products, including the products accused of infringement in this case, in the United States, the State of Texas, and the Eastern District of Texas.

20. On information and belief, Defendant Mindspeed Technologies, Inc. (Mindspeed) is a corporation organized and existing under the laws of the State of Delaware with its principal place of business located at 4000 MacArthur Blvd., East Tower, Newport Beach, California 92660.

21. On information and belief, Mindspeed is registered to do business in the State of Texas and has conducted and continues to conduct business within the State of Texas. Mindspeed directly or through intermediaries (for example, through Technical Marketing Inc. at 3320 Wiley Post Road, Carrollton, Texas 75006) ships, distributes, offers for sale, sells, and advertises its products, including the products accused of infringement in this case, in the United States, the State of Texas, and the Eastern District of Texas.

22. On information and belief, Defendant Netronome Systems, Inc. (Netronome) is a corporation organized and existing under the laws of the State of Delaware with its principal place of business at 144 Emeryville Drive, Suite 230, Cranberry Twp., Pennsylvania 16066.

23. On information and belief, Netronome is registered to do business in the State of Texas and has conducted and continues to conduct business within the State of Texas. Netronome directly or through intermediaries (for example, through TL Marketing, 5057 Keller Springs Road, Suite 300, Dallas, Texas 75001) ships, distributes, offers for sale, sells, and advertises its products, including the products accused of infringement in this case, in the United States, the State of Texas, and the Eastern District of Texas.

24. On information and belief, Defendant Zoran Corporation (Zoran) is a corporation organized and existing under the laws of the State of Delaware with its principal place of business located at 1390 Kifer Road, Sunnyvale, California 94086.

25. On information and belief, Zoran is registered to do business in the State of Texas and has conducted and continues to conduct business within the State of Texas. Zoran directly or through intermediaries ships, distributes, offers for sale, sells, and advertises its products, including the products accused of infringement in this case, in the United States, the State of Texas, and the Eastern District of Texas.

26. This Court has personal jurisdiction over each Defendant. Each Defendant has conducted and does conduct business within the State of Texas. Each Defendant, directly or through intermediaries (including distributors, retailers, sales representatives, or others), imports, ships, distributes, offers for sale, sells, and/or advertises (including the provision of an interactive web page) its products in the United States, the State of Texas, and the Eastern District of Texas.

27. Additionally, each Defendant has purposefully and voluntarily sold the products accused of infringement in this case directly to consumers in the Eastern District of Texas and/or placed one or more of the accused products, as described below, into the stream of commerce with the expectation that they will be purchased by consumers in the Eastern District of Texas. Such products have been purchased by consumers in the Eastern District of Texas. Each Defendant has thus committed patent infringement within the State of Texas, and particularly within the Eastern District of Texas.

THE PATENTS-IN-SUIT: U.S. PATENT NOS. 5,796,978 AND 6,047,354

Ownership

28. United States Patent No. 5,796,978 (the '978 patent), entitled "Data Processor Having an Address Translation Buffer Operable With Variable Page Sizes," was duly and legally issued to Hitachi, Ltd. (Hitachi) on August 18, 1998. A copy of the '978 patent is attached as Exhibit A and is made a part of this Complaint.

29. United States Patent No. 6,047,354 (the '354 patent), entitled "Data Processor For Implementing Virtual Pages Using a Cache and Register," was duly and legally issued to Hitachi on April 4, 2000. A copy of the '354 patent is attached as Exhibit B and is made a part of this Complaint.

30. Plaintiff APT is currently the assignee and sole owner of the patents-in-suit (and all worldwide counterparts), including without limitation all rights to sue for past, present and future infringement, including the right to collect and receive any damages, royalties or settlements for such infringements, all rights to sue for injunctive or other equitable relief, and any and all causes of action relating to any inventions of these patents.

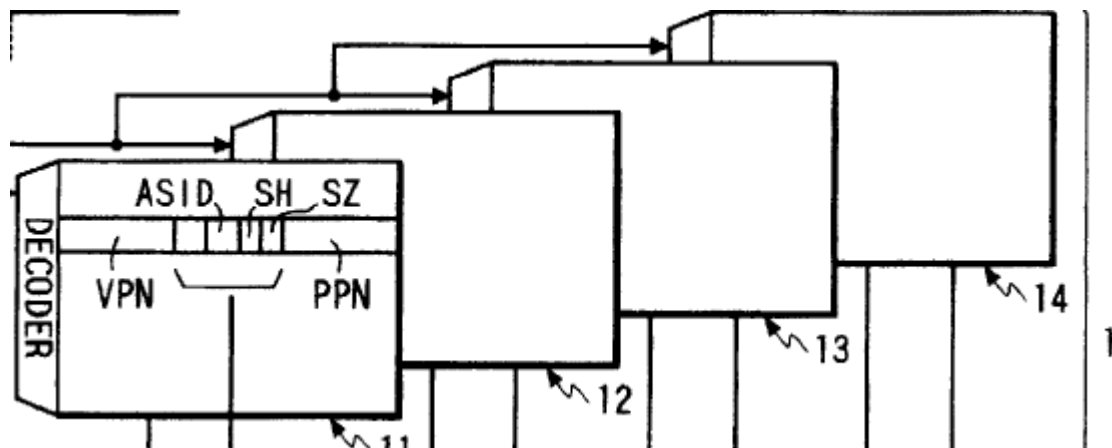
Brief Summary of the Technology

31. Virtual memory is a memory management technique that allows a program to be designed as though there is only a single hardware memory device (*i.e.*, the "virtual" single memory device containing *logical* memory addresses) when, in fact, there may be a plurality of memory devices with portions of each supporting the program (*i.e.*, the physical memory devices containing *physical* memory addresses). Systems that employ virtual memory, among other things, may use physical memory more efficiently and render the programming of applications easier.

32. Computer operating systems that employ virtual memory typically contain a data processor that supports an address translation mechanism in order to translate a logical memory

address from the virtual memory (*e.g.*, when requested by a program) into a physical memory address from the physical memory. Such systems may do so by utilizing, among other things, a buffer memory, which may be known as a translation lookaside buffer (TLB).

33. As illustrated in Figure 1 of the '978 patent, the buffer memory **1** (*e.g.*, a TLB) may contain a plurality of banks **11-14**, each of which has “memory fields” (rows containing information representing a virtual page, physical page information corresponding to the virtual page information, etc.) for storing information. Such information may be used to associate a requested logical memory address with the physical memory address.



34. If the buffer memory contains the requested data, such data may be obtained more quickly for use by the program because the system need not locate and retrieve the data from physical memory. Using virtual memory in this way allows for increases in efficiency and decreases in physical memory accesses.

35. Prior art data processors, among other things, employed a “one size fits all” approach to virtual page size. That is, prior art data processors contained buffer memories that operated with uniformly-sized virtual pages. If, for example, a task to be executed was composed of a program of relatively small size, but the “fixed” virtual page size was large, more memory space than was necessary was assigned to each logical address and efficiency was compromised (*e.g.*, the virtual memory was not maximized).

36. The '978 patent discloses data processors that support *variable* page sizes and, consequently—among other things—achieve greater processing efficiency.

37. When a cache memory is full, and the requested data is not identified within the cache memory, information stored in the cache memory must be replaced with the requested data retrieved from physical memory. The '354 patent discloses data processors, and a method utilizing such processors, comprising registers that store information from the CPU related to which entry within the cache memory is to be replaced. Among other things, data processors of the '354 patent improve the degree of freedom for replacement of information stored in the cache memory.

DIRECT INFRINGEMENT BY DEFENDANTS

38. Plaintiff realleges and incorporates herein by reference the allegations stated in paragraphs 1-37 of this Complaint.

39. Each Defendant makes, uses, sells, imports, and/or offers for sale products and/or methods that infringe one or more claims of the '978 patent and that infringe one or more claims of the '354 patent. None of Defendants' infringing acts were or are authorized.

40. Specifically, each Defendant makes, uses, sells, imports, and/or offers for sale infringing data processors with memory management units (MMUs), or products containing infringing data processors with MMUs.

41. For example, without limitation, each of the Defendants makes, uses, sells, imports, and/or offers for sale one or more of the following processors (and/or products incorporating the same): ARM9 series processors with MMUs (*e.g.*, ARM920T, ARM922T, ARM926EJ-S); and ARM11 series processors with MMUs (*e.g.*, ARM1136JF-S, ARM1136J-S, ARM1176JZ-S, ARM1176JZF-S).

42. On information and belief, the structure and operation of each of the ARM9 and ARM11 series processors identified in Paragraph 41 are identical with respect to the claims of the patents-in-suit.

43. Each of the Defendants' infringing processors is operable with a buffer memory having a plurality of page sizes including, for example, two or more of: large page sizes (*e.g.*, 64 KB), small page sizes (*e.g.*, 4 KB), and tiny page sizes (*e.g.*, 1 KB).

44. Each of the Defendants' infringing processors contains, among other things, a register that stores information from the CPU that designates which entry within the cache memory is to be replaced.

45. Accordingly, each Defendant has directly infringed and continues to directly infringe, either literally or under the doctrine of equivalents, one or more claims of the '978 patent and one or more claims of the '354 patent by making, using, selling, importing and/or offering for sale such infringing products and/or methods.

46. Plaintiff APT has suffered damages as a result of Defendants' infringement and will continue to suffer damages as a result of Defendants' infringement.

DEMAND FOR JURY TRIAL

Plaintiff APT demands a trial by jury on all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for judgment as follows:

- (a) that each Defendant has directly infringed one or more claims of the '978 patent;
- (b) that each Defendant has directly infringed one or more claims of the '354 patent;
- (c) that Plaintiff be awarded damages from Defendants adequate to compensate for Defendants' infringement, but in no event no less than a reasonable royalty, as provided by 35 U.S.C. § 284;
- (d) that a reasonable royalty going forward be awarded for Defendants' future infringement, or in the alternative, that an injunction be issued against further infringement by Defendants and their directors, officers, agents, servants, employees, attorneys and all persons in active concert or participation with them; and
- (e) that Plaintiff be granted such other and further relief, in law or in equity, as the Court deems just and equitable.

Dated this 18th day of January, 2011.

By: /s/ Adam V. Floyd

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